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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/728,594	12/03/2003	Dale Alan Nugent	14426.1USU1	8966
7590 12/29/2005 Merchant & Gould P.C. P.O. Box 2903 Minneapolis, MN 55402-0903			EXAMINER KRISHNAMURTHY, RAMESH	
			ART UNIT 3753	PAPER NUMBER

DATE MAILED: 12/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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<b>Interview Summary</b>	Application No.	Applicant(s)	
	10/728,594	NUGENT ET AL.	
	Examiner	Art Unit	
	Ramesh Krishnamurthy	3753	

All participants (applicant, applicant's representative, PTO personnel):

- (1) Ramesh Krishnamurthy. (3) John Allan Kielb (Inventor).  
 (2) Joshua N. Randall (Attorney). (4) \_\_\_\_.

Date of Interview: 21 December 2005.

Type: a) ☒ Telephonic b) ☐ Video Conference  
 c) ☐ Personal [copy given to: 1) ☐ applicant 2) ☐ applicant's representative]

Exhibit shown or demonstration conducted: d) ☐ Yes e) ☒ No.  
 If Yes, brief description: \_\_\_\_\_.

Claim(s) discussed: 1 - 25.

Identification of prior art discussed: Gibbs (US 1,098,247) & JP 11117915.

Agreement with respect to the claims f) ☐ was reached. g) ☒ was not reached. h) ☐ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: See Attachment.

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN A NON-EXTENDABLE PERIOD OF THE LONGER OF ONE MONTH OR THIRTY DAYS FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

Examiner Note: You must sign this form unless it is an Attachment to a signed Office action.

  
 Examiner's signature, if required

## Summary of Record of Interview Requirements

### Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record

A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

### Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews

#### Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

#### 37 CFR §1.2 Business to be transacted in writing.

All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:

- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:

- 1) A brief description of the nature of any exhibit shown or any demonstration conducted,
- 2) an identification of the claims discussed,
- 3) an identification of the specific prior art discussed,
- 4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
- 5) a brief identification of the general thrust of the principal arguments presented to the examiner,  
(The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
- 6) a general indication of any other pertinent matters discussed, and
- 7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

### Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.

**Interview Summary (Attachment)**

Inventor Kielb gave an outline of the advantages of the instant device as it applies to the semiconductor processing industry. The advantages in comparison to other flow metering/controlling devices as listed by Kielb include the broader range of flows, less clogging and straighter flow through the orifice having lesser flow impact as the valve itself forms the orifice. Also, the orifice in the instant invention is longer in the flow direction than it is wide (Figs. 9 and 10). Attorney Randall then presented arguments as to how some of the proposed amendments (see copy of the fax attached) distinguish over the Gibbs reference. One is that in Gibbs the maximum cross sectional area of the orifice is same as that of the conduit and secondly, the width of the moveable element and therefore the width of the orifice is larger than its length in the flow direction. As for the Japanese reference, attorney pointed out that it has a fixed orifice. The examiner responded that in claim 16 to which the Japanese reference was applied only called for the flow control section to have a tapered surface associated therewith. Attorney agreed to consider that aspect in preparing a formal amendment/response to be filed in due course.

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**Fax Transmission** | December 20, 2005

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To:	Examiner Krishnamurthy	From:	Joshua N. Randall
Company:	USPTO	Our Ref.:	14426.1USU1
Your Ref:	10/728,594	Fax No.:	612.332.9081
Fax No.:	571.273.4914	Phone No.:	612.332.5300
Phone No.:	571.272.4914	Total Pages:	8 (including cover page)
State/Country:		E-Mail:	jrandall@merchant-gould.com
Confirmation Via Mail:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Return Fax To:	Andrea Endris

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Outline for Phone Conference December 21, 2005 at 11:00 EST

S/N 10/728,594

Attorney Docket No. 14426.1USU1

APPARATUS FOR CONTROLLING AND METERING FLUID FLOW

- I. Discuss context of the invention. Inventor John Kielb will be participating.
- II. Discuss Gibbs (US 1,098,247) embodiments (Figs. 5-6 and 8-9).
- III. Discuss proposed amendments.

## Proposed Claim Amendments

S/N 10/728,594

Attorney Docket No. 14426.1USU1

## APPARATUS FOR CONTROLLING AND METERING FLUID FLOW

1. A device for controlling fluid flow, of the type having a variable orifice and configured to use a pressure signal, comprising:
  - a fluid flow conduit having a circular cross section;
  - an orifice defined along a length of the conduit, the orifice defining a rectangular cross section having at least one planar ~~inner~~ wall extending in a longitudinal direction of the conduit; and
  - an element having a linear edge configured to mate with the at least one planar ~~inner~~ wall of the ~~fluid flow conduit~~ orifice to form a seal therewith, the element being movable in a direction transverse to the longitudinal direction between an open position wherein fluid flows through the ~~conduit~~ orifice and a closed position wherein the element substantially shuts off fluid flow in the ~~conduit~~ orifice.
2. The variable orifice of claim 1, wherein ~~the conduit has a rectangular cross-section and the element is substantially rectangular-shaped~~ <sup>maximum</sup> the cross sectional area of the orifice is less than half the cross sectional area of the conduit.
3. The variable orifice of claim 1, wherein the ~~conduit~~ orifice includes at least one contoured sidewall and the element includes at least one edge having a curvature that substantially matches the cross-sectional shape of the contoured sidewall of the ~~conduit~~ orifice.
4. The variable orifice of claim 1, wherein the pressure signal is provided by a pressure sensor mounted in the housing.
5. The variable orifice of claim 1, wherein the pressure signal is provided by a pressure device mounted outside the housing either upstream or downstream of the device.

6. A device for measuring fluid flow, of the type having a variable orifice and configured to use a pressure signal, comprising:

a fluid flow conduit having at least one planar inner wall extending in a longitudinal direction of the conduit, the plan inner wall directly exposed to fluid flowing through the conduit in the longitudinal direction; and

an element having a linear edge configured to mate with the at least one planar inner wall of the fluid flow conduit to form a seal therewith, the element being movable in a direction transverse to the longitudinal direction between an open position wherein fluid flows through the conduit and a closed position wherein the element substantially shuts off fluid flow in the conduit.

7. The variable orifice of claim 6, wherein the conduit has a rectangular cross-section and the element is substantially rectangular shaped.

8. The variable orifice of claim 6, wherein the conduit includes at least one contoured sidewall and the element includes at least one edge that has a curvature that substantially matches the cross-sectional shape of the contoured sidewall of the conduit.

9. The variable orifice of claim 6, wherein the pressure signal is provided by a pressure sensor mounted in the housing.

10. The variable orifice of claim 6, wherein the pressure signal is provided by a pressure device mounted outside the housing either upstream or downstream of the device.

11. A device for controlling fluid flow, of the type having a variable orifice and a pressure sensor, comprising:

a conduit having first, second and third segments, the first and third segments having a circular cross-section, and the second segment having a non-circular cross-section with at least two planar portions and being positioned between the first and third segments; and



an element having at least one linear edge configured to engage the second segment to substantially shut off fluid flow in the conduit.

12. A device for measuring and controlling fluid flow, comprising:  
a conduit having an input portion with an inner circular cross-section, and an orifice portion with an inner rectangular cross-section;  
a pressure sensor configured to measure pressure within the conduit; and  
a movable element adapted and configured to engage the inner rectangular cross-section of the orifice portion to control fluid flow.

13. An apparatus for controlling and metering fluid flow, comprising:  
a housing including:  
a fluid flow conduit having first, second and third portions along a length of the conduit, the first and third portions having a circular cross-section and the second portion including at least one planar sidewall and being positioned between the first and third portions;  
an element bore extending transverse to the conduit and providing access to the second portion; and  
first and second sensor chambers each having an inlet and an outlet, the inlet and outlet of the first sensor chamber being in fluid communication with respective first and second portions of the conduit, and the inlet and outlet of the second sensor chamber being in fluid communication with respective second and third portions of the conduit;  
an element having a linear edge configured to mate with the at least one flat sidewall to form a seal therewith and movable in the element bore between an open position wherein fluid flows through the conduit and a closed position wherein the element substantially shuts off fluid flow through the conduit; and  
first and second pressure sensors mounted in respective first and second sensor chambers and configured to determine a pressure differential in the housing.

14. The apparatus of claim 13, wherein the first and third portions of the conduit have a circular cross-section, and the second portion of the conduit has a rectangular cross-section.

15. The apparatus of claim 13, wherein the second portion of the conduit includes a flow control section having a smaller cross-sectional area than the larger cross-sectional area of the remaining sections of the second portion.

16. The apparatus of claim 15, wherein the flow control section includes an inlet and an outlet that each include at least one tapered surface that transitions from the smaller cross-sectional area to the larger cross-sectional area of the remaining sections of the second portion.

17. The apparatus of claim 13, wherein the element includes a face surface having a leading edge facing upstream to the fluid flow and a trailing edge facing downstream to the fluid flow, the face surface being substantially planar and the trailing edge including a taper

18. The apparatus of claim 13, wherein the housing is divided into at least first and second portions along a plane that passes through a center of the conduit.

19. The apparatus of claim 13, wherein the first and second sensor chambers are accessible through respective first and second sensor bores that extend transverse to the conduit.

20. The apparatus of claim 19, wherein the first and second sensor bores extend in a direction perpendicular to the direction of the element bore.

21. A method of controlling fluid flow through a device that includes a pressure sensor, a conduit having a first portion with a circular inner cross-section and a second portion with a rectangular inner cross-section, and a movable element having at least one linear edge, the method comprising the steps of:

moving the movable element in the conduit in a direction transverse to a direction along a length of the conduit; and

engaging the linear edge of the movable element with the at least one flat sidewall of the conduit when in the closed position to form a seal with the at least one flat sidewall.

22. The method of claim 21, wherein the device further includes a housing, and the conduit extends through the housing, the housing including a sensor chamber positioned between and in fluid communication with the first and second portions of the conduit, and a element bore extending transverse to the conduit and providing access to the second portion of the conduit, and the movable element extends through the element bore.

23. A method of metering fluid flowing through a device that includes a conduit having a first portion with a circular inner cross-section and a second portion with a rectangular inner cross-section, and a movable element having at least one linear edge, and is configured to use a pressure signal, the method comprising the steps of:

moving the movable element in the conduit in a direction transverse to a longitudinal direction along a length of the conduit; and

engaging the linear edge of the movable element with the at least one flat sidewall of the conduit when in the closed position to form a seal with the at least one flat sidewall.

24. The method of claim 23, wherein the device further includes a housing, and the conduit extends through the housing, the housing including a sensor chamber positioned between and in fluid communication with the first and second portions of the conduit, and a element bore extending transverse to the conduit and providing access to the second portion of the conduit, and the movable element extends through the element bore.

25. A method of metering and controlling fluid flow through a fluid flow apparatus, the apparatus including a housing, a movable element, and first and second pressure sensors, the method comprising the steps of:

forming a conduit through the housing, the conduit including at least first, second and third portions, the first and third portions having a circular inner cross-section and the second portion including at least one planar sidewall;

forming first and second sensor chamber in the housing so as to be in fluid communication with respective first and second portions of the conduit and second and third portions of the conduit,

forming a element bore in the housing that extends transverse to the conduit and provides access to the second portion of the conduit;

moving the movable element in the element bore to control fluid flow in the conduit;

engaging the linear edge of the movable element with the at least one planar sidewall of the conduit when in the closed position to form a seal with the at least one planar sidewall;

determining a pressure differential between the first and second sensor chambers using a pressure signal provided by each of the first and second pressure sensors; and

metering the fluid flow based on the pressure differential.